

Information Bulletin

Grade 9 Mathematics 1997-98

This document was written primarily for:

Students	✓
Teachers	✓ Grade 9 Teachers
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

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This bulletin contains general information about the Provincial Achievement Testing Program and information specific to the Grade 9 Mathematics Achievement Test. **This bulletin replaces all previous bulletins.**

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September 1997

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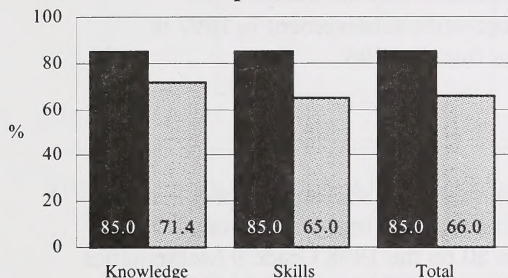


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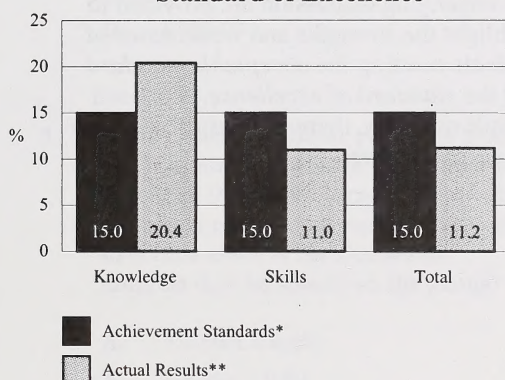
Looking Back: Highlights of 1997

This information provides teachers, school administrators, and the public with an overview of the results for the June 1997 Grade 9 Mathematics provincial assessment. It complements the detailed school and jurisdiction reports.

Acceptable Standard



Standard of Excellence



*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

**the percentage of students in the province who met the standards (based on those who wrote)

Who Wrote the Test?

All students registered in Grade 9 were expected to write the 1997 Mathematics Achievement Test. A total of 35 040 students wrote the test. In 1997, only a small proportion of students in Grade 9 did not write the test: 4.3% were absent and 4.3% were excused from writing by their superintendent.

What Was the Test Like?

The test had 55 questions in four content areas: Number, Patterns and Relations, Shape and Space, and Statistics and Probability. The questions were classified in two reporting categories: Knowledge and Skills.

The test was divided into two parts. The first part had 45 multiple-choice questions, each with four alternatives. Students recorded their responses to questions on a separate answer sheet. The second part had 10 numerical-response questions that required students to calculate the answer and then record it on the answer sheet.

How Well Did Students Do?

As shown by the graphs, the number of students meeting the *acceptable standard* was lower than expected. The difficulties that students have in mathematics is most evident in questions requiring application. Students were more successful with knowledge questions. The number of students meeting the *standard of excellence* was higher than expected in the knowledge component and lower than expected in the skills component. In 1.1% of the schools, the percentage of students meeting the *acceptable standard* was significantly above expectations for the province. In 34.3% of the schools, the

percentage of students meeting the *acceptable standard* was not significantly different from provincial expectations. This is a decrease of 6.6% from last year's results. In 64.6% of schools, the percentage of students meeting the *acceptable standard* was significantly below provincial expectations. Schools where fewer than five students wrote the Grade 9 test are not included in these school calculations.

These results are based on scores achieved by all students writing in English. Results

for students writing in French will be reported separately.

Has Achievement Changed Since Last Year?

A study of changes in achievement was conducted as part of the provincial assessment. Results indicate that mathematics achievement in 1997 is lower than in 1996.

Commentary and Sample Questions from the Grade 9 Mathematics Achievement Test 1997

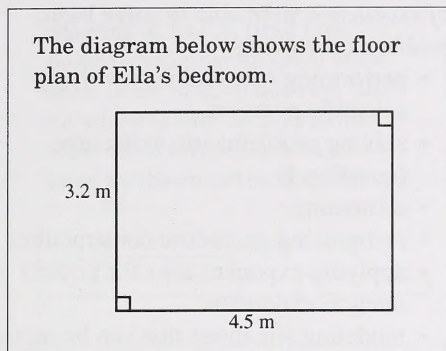
Time allotted for completing the Achievement Test

Many teachers across the province observed and reported that students felt pressured to complete the number of questions on the achievement test in the time allowed, and some were unable to complete the achievement test even with the additional

30 minutes. To address this problem, the number of questions will be reduced from 55 to 50 on the 1998 Grade 9 Mathematics Achievement Test.

Sample questions from the test and accompanying discussion are provided to highlight the strengths and weaknesses of students meeting the *acceptable standard* and the *standard of excellence*. For each sample question, there is an asterisk beside the correct answer.

Use the following information to answer question 1.



Acceptable Standard

Question 1 required students to use area to solve a problem in a meaningful context. Over 95% of students meeting the *acceptable standard* but not the *standard of excellence* can do this.

1. How much would it cost to carpet Ella's room if the cost of carpet is \$45.00/m²?

A. \$346.50
B. \$594.00
* C. \$648.00
D. \$693.00

3. If Raja wants a cellular phone, he must pay 50¢/min for each call plus a monthly fee of \$25.00. Which formula would give the phone cost for one month if c is cost in dollars and x is the number of minutes that he spends on the phone?

A. $c = 50(x + 0.25)$
B. $c = 25x + 0.50$
C. $c = 0.50(x + 25)$
* D. $c = 0.50x + 25$

33. What is the solution for $x - 4.6 \geq -26.5$?

* A. $x \geq -21.9$
B. $x \leq -21.9$
C. $x \geq -31.1$
D. $x \leq -31.1$

Question 3 required students to model a situation with a first-degree expression. Of students meeting the *acceptable standard* but not the *standard of excellence*, 88% can do this.

Question 33 required students to solve an inequality. About 50% of the students meeting the *acceptable standard* but not the *standard of excellence* answered this question correctly.

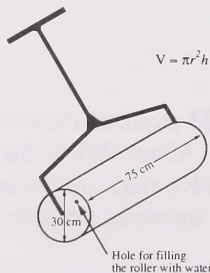
Overall, results show that students who met the *acceptable standard* but not the *standard of excellence* were able to solve basic problems involving

- performing calculations involving scientific notation
- solving problems involving area (question 1)
- estimating
- recognizing geometric constructions
- applying exponent laws for powers with integral exponents
- modeling situations that can be represented by first-degree expressions (question 3)
- identifying constant terms, coefficients, and variables in polynomial expressions

These students had difficulty

- using logic and patterns to solve problems
- solving inequality conditions (question 33)
- solving complex problems
- displaying the solution of a first-degree inequality on a number line
- using trigonometric ratios to solve problems involving a right triangle
- solving problems involving the effects of dimension changes
- using spatial problem-solving in describing geometric shapes
- determining an apparent relationship displayed in a scatterplot

23. The slow-pitch team was using a roller like the one shown below to prepare the infield paths on their ball diamond. About how much water is needed to fill the roller? (1 mL = 1 cm³)



- A. 50 mL
- B. 3 500 mL
- C. 7 000 mL
- * D. 50 000 mL

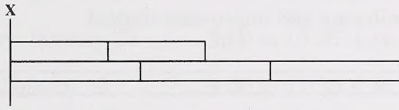
Standard of Excellence

The following commentary highlights the skills and knowledge of students who met the *standard of excellence*.

Question 23 required students to solve a problem involving volume. Of students achieving the *standard of excellence*, 98% could solve this question.

Use the following information to answer numerical-response question 7.

Starting at line X, Brad lays down rectangular strips of wood, each 18 cm long, in one row. In an adjacent row, he lays down other wood strips, each 24 cm long, as shown in the diagram.



NR7. At what distance from line X will the ends of the two different strips first align?

Answer: 72 cm

the problem. Most of the students achieving the *standard of excellence* answered this question correctly.

Students who met the *standard of excellence* demonstrated more success than did other students when answering questions that required applying mathematical concepts in novel or new contexts. Specifically, students meeting this standard could

- use logic and patterns to solve problems (question NR7)
- solve problems using rational numbers in meaningful contexts
- solve problems involving area, perimeter, surface area, and volume (question 23)
- solve complex problems

Reporting the Results

On August 22, 1997, each school jurisdiction received electronically, a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Two copies of an individual profile for each student will be sent to the school that the student will attend in September. We expect that the Parent Copy will be given to be parents and the School Copy will remain with the student's record.

The following Achievement tests are secured:

Grade 6 Mathematics, 1995
ALL tests from 1996 and 1997

Numerical-response question 7 required students to use logic and patterns to solve

Looking Ahead: What is Upcoming for 1998

General Information

Purpose

The purpose of the Achievement Testing Program is to

- determine if students are learning what they are expected to learn
- report to Albertans how well students have achieved provincial standards at given points in their schooling
- assist schools, jurisdictions, and the province in monitoring and improving student learning

Enhance Student Learning

Careful examination and interpretation of the results can help identify areas of relative strength and weakness in student achievement. Teachers and administrators can use this information in planning and delivering relevant and effective instruction in relation to broad, general learnings in the *Program of Studies*.

Enable Accountability

Alberta Education and school jurisdiction personnel are responsible for ensuring that the highest quality education is provided to all students in the province.

Information about achievement is provided to

- schools and jurisdictions
- parents
- the public

so that they may know how well students in their schools are meeting local targets and provincial expectations.

Interpreting Results

Achievement tests assess only part of what is to be learned. In addition, many factors contribute to student achievement. Personnel at the jurisdiction and school levels are in the best position to appropriately interpret, use, and communicate jurisdiction and school results in the local context.

The Provincial Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at Grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards that reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Tests

Information about the nature of the provincial assessments as well as their administration to special needs students can be found in the *General Information Bulletin, Achievement Testing Program*, which is mailed each fall to all superintendents and principals.

Schedule

The schedule for administering achievement tests in the 1997–98 school year is mandated.

January 1998

The January achievement tests for Grade 9 schools on a semester system must be administered according to the following schedule:

Wednesday, January 21	9:00 to 11:30 A.M.	Grade 9 English Language Arts Part A
Thursday, January 22	9:00 to 10:45 A.M.	Grade 9 Science
Friday, January 23	9:00 to 11:30 A.M.	Grade 9 Français/French Language Arts Partie A
Monday, January 26	9:00 to 10:45 A.M.	Grade 9 English Language Arts Part B
Tuesday, January 27	9:00 to 10:45 A.M.	Grade 9 Mathematics
Wednesday, January 28	9:00 to 10:45 A.M.	Grade 9 Social Studies
Thursday, January 29	9:00 to 10:45 A.M.	Grade 9 Français/French Language Arts Partie B

May 1998

The written component of the language arts achievement tests for grades 3, 6, and 9 must be administered according to the following schedule:

Tuesday, May 26	9:00 to 10:30 A.M.	Grade 3 English Language Arts Part A
	9:00 to 11:30 A.M.	Grades 6 and 9 English Language Arts Part A
Thursday, May 28	9:00 to 11:30 A.M.	Grades 6 and 9 Français/French Language Arts Partie A

June 1998

The machine-scorable component of achievement tests for grades 3, 6, and 9 must be administered according to the following schedule:

Monday, June 15	9:00 to 10:30 A.M.	Grade 3 English Language Arts Part B
	9:00 to 10:30 A.M.	Grade 6 English Language Arts Part B
Wednesday, June 17	9:00 to 10:30 A.M.	Grade 3 Mathematics
	9:00 to 10:30 A.M.	Grade 6 Mathematics
Thursday, June 18	9:00 to 10:30 A.M.	Grade 6 Social Studies
	9:00 to 10:45 A.M.	Grade 9 Français/French Language Arts Partie B
Friday, June 19	9:00 to 10:45 A.M.	Grade 9 Science
Monday, June 22	9:00 to 10:30 A.M.	Grade 6 Science
	9:00 to 10:45 A.M.	Grade 9 English Language Arts Part B
Tuesday, June 23	9:00 to 10:30 A.M.	Grade 6 Français/French Language Arts Partie B
	9:00 to 10:45 A.M.	Grade 9 Mathematics
Wednesday, June 24	9:00 to 10:45 A.M.	Grade 9 Social Studies

The tests that will be administered each year are:

Grade 3

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Grade 6

English Language Arts (*Part A: Writing and Part B: Reading*)

Français/French Language Arts
(*Partie A: Production écrite and
Partie B: Lecture*)

Mathematics (English and French forms)

Science (English and French forms)

Social Studies (English and French forms)

Grade 9

English Language Arts (*Part A: Writing and Part B: Reading*)

Français/French Language Arts
(*Partie A: Production écrite and
Partie B: Lecture*)

Mathematics (English and French forms)

Science (English and French forms)

Social Studies (English and French forms)

Students in French Programs

All students in French programs must write English Language Arts, French Language Arts and French versions of other achievement tests if their language of instruction is french. Alberta Education will send a checklist to schools in January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

Marking Achievement Tests Locally

Teachers are able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year-end assessment, as well as for planning instruction.

Standards: Curriculum, Assessment, Achievement

The move toward results-based curricula has re-emphasized the need for a clear delineation of standards and their purpose. All standards and all methods of setting standards require judgement.

The process of setting a standard can only be as good as the judgements that go into it. The standard will depend on whose judgements are involved in the process. In this sense, all standards are subjective. Yet once a standard has been set, the decisions based on it can be made objectively. Instead of a separate set of judgements for each test-taker, you will have the same set of judgements applied to all test-takers. Standards cannot be objectively determined, but they can be objectively applied.¹

Definitions

The Achievement Testing Program is directly concerned with three different but related standards. These provincial standards are curriculum standards, assessment standards, and achievements standards. Local targets are also described in this section.

- **Curriculum Standards** are the expected student learnings sequenced into grade levels. They include broad statements of knowledge, skills, and attitude expectations against which student performance is judged. These standards are established in the process of curriculum development and are found in the *Program of Studies* document produced for each subject.
- **Assessment Standards** are the criteria adopted for judging actual student achievement relative to curriculum standards. They are ultimately expressed and applied to test scores. They are derived from answers to questions such as:

¹ Passing Scores; Samuel A. Livingston, Michael J. Zieky; Educational Testing Service, 1982.

What scores must a student obtain or how many questions on a given test must a student answer correctly in order for his/her performance on the test to be judged as acceptable or excellent?

- **Achievement Standards** are judgements that specify what percentages of students are expected to achieve an acceptable and an excellent level of achievement in relation to each course of studies; i.e., to the relevant curriculum standards. They reflect community judgement about what is an appropriate expectation for students. It is important to point out that this judgement is not a prediction of the percentage of students who will actually achieve acceptable or excellent levels, but rather a specification of the percentage of students at a given grade or year in school who are *expected* to achieve the acceptable (85%) or excellent standard (15%). **The 85% of students expected to meet the *acceptable standard* includes those students who meet the *standard of excellence*.** These standards apply to school, jurisdiction, and provincial performance.
- **Local targets** are goals set in schools/districts to focus plans for helping students learn what is expected by the provincial government. These local targets reflect the specific needs of students, the views of teachers, school administration, and the local community, and the resources available to provide learning opportunities for students.

Confirming Standards

Confirming standards is a process whereby judgements about students' performance on the assessment are made in relation to provincial standards. For more information on confirming standards procedures, refer to Appendix A of the *Achievement Testing Program Provincial Report, June 1993 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the current *General Information Bulletin, Achievement Testing Program*.

Purpose of Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned mathematics by the end of Grade 9. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 9 students in all types of school programs—public, private, and home education. By comparing actual results with provincial standards, decisions can be made about whether achievement is, in fact, “good enough.”

Description of the Mathematics Assessment Standards

The following statements describe what is expected of Grade 9 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 9 Mathematics program. The statements represent the standards against which student achievement will be measured.

<i>Acceptable Standard</i>	<i>Standard of Excellence</i>
<p>Students who meet the <i>acceptable standard</i> in Grade 9 Mathematics have a basic understanding of mathematical concepts, related procedures, and problem-solving applications. They can demonstrate understanding in concrete, pictorial, and symbolic modes, and translate from one mode to another. For example, students meeting the <i>acceptable standard</i> know that the solution to the equation $4(x + \frac{1}{2}) = -3$ is $-\frac{5}{4}$ and are able to demonstrate their understanding by explaining how this solution can be arrived at and what it means for the solution to be $-\frac{5}{4}$. They are able to communicate and verify the solution in any of the three modes.</p> <p>To meet the <i>acceptable standard</i>, students explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models of representation.</p> <p>Students meeting the <i>acceptable standard</i> perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply what they know in solving straightforward problems in familiar settings. They are able to describe the steps they used to solve a particular problem and to verify and defend their solution to the problem.</p> <p>Students meeting the <i>acceptable standard</i> have a positive attitude about mathematics and a sense of personal competence in using mathematics. They demonstrate confidence when using common mathematical procedures and when applying problem-solving strategies in familiar settings.</p>	<p>Students who meet the <i>standard of excellence</i> in Grade 9 Mathematics have a superior understanding of mathematical concepts, related procedures, and applications in novel problem-solving situations. They are comfortable demonstrating their understandings in concrete, pictorial, or symbolic forms of representation. For example, they are able to show that a triangle maintains its shape and its size whenever it is reflected in either of the coordinate axes. They are able to demonstrate this property by determining measurements using the properties of congruent triangles, and by using the length properties of segments on Cartesian grids. They are able to create and generalize problem situations to illustrate concepts and to analyze and explain relationships among concepts.</p> <p>To meet the <i>standard of excellence</i>, students model mathematical situations clearly, using oral, written, concrete, pictorial, graphical, and algebraic methods. They are expected to understand mathematical questions presented with objects, diagrams, or symbols in both common and unusual contexts.</p> <p>Students meeting the <i>standard of excellence</i> perform the mathematical operations and procedures that are fundamental to mathematics in Grade 9 and apply mathematical thinking and modeling to solve and create non-routine problems. They are able to clearly describe the steps that they or other students used to solve a particular problem and can suggest alternative procedures and/or solutions. They are able to generalize solutions and strategies to new problem situations.</p> <p>Students meeting the <i>standard of excellence</i> have a positive attitude toward mathematics and show confidence in using mathematics meaningfully. They are self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.</p>

Grade 9 Mathematics Assessment

General Description

The Grade 9 Mathematics Achievement Test consists of two sections:

- one section has 6 numerical-response questions, each with a value of one mark
- the other section has 44 multiple-choice questions, each with a value of one mark
- the sections may be done in whatever order you choose

The questions are integrated in narrative themes.

The assessment is designed to be completed in 75 minutes. However, additional time of up to 30 minutes may be provided to allow students to finish.

The blueprint for the assessment is on the next page of this bulletin and is followed by practice questions that teachers can use with students to help them prepare for the provincial assessment.

Students also will require a scientific calculator, HB pencils, a ruler, and an eraser. See the *Interim Policy: Use of Calculators on Alberta Education Achievement Tests* on page 32.

Students may use manipulative materials when completing the test.

Reporting Categories Indicators

The following points briefly highlight the learnings for each reporting category.

Knowledge

- recalls facts, concepts, terminology
- knows procedures for algorithms and computations, and for using formulas
- knows procedures for constructions, measurements, conversions, and order of operations
- knows mental computation and estimation strategies
- knows how to use calculators and computers

Skills

- applies basic mathematical concepts in familiar and unfamiliar situations
- demonstrates relationships among number systems, operations, number forms (fractions, decimals, powers, etc.), and concrete, pictorial, and symbolic representation
- demonstrates and applies relationships within equations and formulas
- demonstrates and applies relationships among geometric forms in a variety of situations
- demonstrates relationships between numbers and geometric forms
- uses a variety of strategies to solve problems
- applies data management skills to solve problems
- judges the reasonableness of a solution

Blueprint

The blueprint for mathematics shows the content strands and reporting categories under which questions on the test are classified. The number of questions in each category is approximate.

General Outcomes*	Knowledge	Skills	Total Number of Questions
Number <ul style="list-style-type: none"> Explain and illustrate the structure and the interrelationship of the sets of numbers within the rational number system Develop a number sense of powers with integral exponents and rational bases Use a scientific calculator or a computer to solve problems involving rational numbers Explain how exponents can be used to bring meaning to large and small numbers, and use calculators or computers to perform calculations involving these numbers 	4	9	13(26%)
Patterns and Relations <ul style="list-style-type: none"> Generalize, design, and justify mathematical procedures, using appropriate patterns, models, and technology Solve and verify linear equations and inequalities in one variable Generalize arithmetic operations from the set of rational numbers to the set of polynomials 	4	11	15(30%)
Shape and Space <ul style="list-style-type: none"> Use trigonometric ratios to solve problems involving a right triangle Describe the effects of dimension changes in related 2-D shapes and 3-D objects in solving problems involving area, perimeter, surface area, and volume Specify conditions under which triangles may be similar or congruent, and use these conditions to solve problems Use spatial problem solving in building, describing, and analyzing geometric shapes Apply coordinate geometry and pattern recognition to predict the effects of translations, rotations, reflections, and dilatations on 1-D lines and 2-D shapes 	5	9	14(28%)
Statistics and Probability <ul style="list-style-type: none"> Collect and analyze experimental results expressed in two variables, using technology, as required Explain the use of probability and statistics in the solution of complex problems 	3	5	8(16%)
Total Number of Questions	16(32%)	34(68%)	50(100%)

**From the Alberta Program of Studies for K–9 Mathematics, June 1996*

Adjustments have been made to the Grade 9 Mathematics Achievement Test to provide strong links with the Alberta Program of Studies, June 1996. Standards will be reviewed to ensure they reflect the dimensions of the program.

Numerical-Response Instructions

- Read each question carefully.
- You are expected to provide your own scientific calculator.
- Manipulatives may be used for this test.
- Record your answer on the answer sheet provided by writing it in the boxes and filling in a circle in the corresponding column.
- Enter the **first digit** of your answer in the **left-hand box** and leave any unused boxes blank.
- Make sure that the number of the question on your answer sheet matches the number of the question you are answering.
- Use **only** an **HB** pencil to mark your answer.
- If you change an answer, **erase** your first mark **completely**.

Example 1

Evaluate 3^5 .

$$3^5 = 3 \times 3 \times 3 \times 3 \times 3$$

$$= 243$$

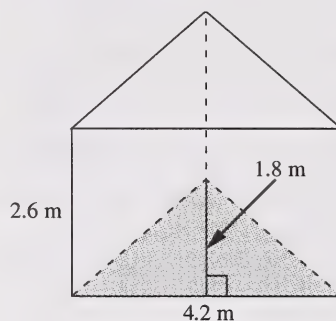
Answer: 243

Record 243 on the answer sheet →

2	4	3	
○	○	○	○
○	○	○	○
○	○	○	○
●	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

Example 2

Find the volume of this solid. (Round your response to the nearest tenth.)



$$\text{Area of the base} = \frac{1}{2}bh$$

$$= \frac{1}{2} \times 4.2 \times 1.8$$

$$= 3.78$$

Volume of the solid = Bh

$$= 3.78 \times 2.6$$

$$= 9.828$$

Answer: (rounded to the nearest tenth)
9.8

Record 9.8 on the answer sheet →

9	.	8	
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

Practice Answer Sheet

NUMERICAL RESPONSE

1					2					3					4					5				
	•	•				•	•				•	•				•	•				•	•		
	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0
	1	1	1	1		1	1	1	1		1	1	1	1		1	1	1	1		1	1	1	1
	2	2	2	2		2	2	2	2		2	2	2	2		2	2	2	2		2	2	2	2
	3	3	3	3		3	3	3	3		3	3	3	3		3	3	3	3		3	3	3	3
	4	4	4	4		4	4	4	4		4	4	4	4		4	4	4	4		4	4	4	4
	5	5	5	5		5	5	5	5		5	5	5	5		5	5	5	5		5	5	5	5
	6	6	6	6		6	6	6	6		6	6	6	6		6	6	6	6		6	6	6	6
	7	7	7	7		7	7	7	7		7	7	7	7		7	7	7	7		7	7	7	7
	8	8	8	8		8	8	8	8		8	8	8	8		8	8	8	8		8	8	8	8
	9	9	9	9		9	9	9	9		9	9	9	9		9	9	9	9		9	9	9	9

6					7					8					9					10				
	•	•				•	•				•	•				•	•				•	•		
	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0
	1	1	1	1		1	1	1	1		1	1	1	1		1	1	1	1		1	1	1	1
	2	2	2	2		2	2	2	2		2	2	2	2		2	2	2	2		2	2	2	2
	3	3	3	3		3	3	3	3		3	3	3	3		3	3	3	3		3	3	3	3
	4	4	4	4		4	4	4	4		4	4	4	4		4	4	4	4		4	4	4	4
	5	5	5	5		5	5	5	5		5	5	5	5		5	5	5	5		5	5	5	5
	6	6	6	6		6	6	6	6		6	6	6	6		6	6	6	6		6	6	6	6
	7	7	7	7		7	7	7	7		7	7	7	7		7	7	7	7		7	7	7	7
	8	8	8	8		8	8	8	8		8	8	8	8		8	8	8	8		8	8	8	8
	9	9	9	9		9	9	9	9		9	9	9	9		9	9	9	9		9	9	9	9

Use the following information to answer question 1.

AMAZING CANADIAN RECORDS

In the 1994 Guinness Book of World Records, there are some astounding Canadian entries. Here are a few of our achievements logged in this edition.

World's tallest snowman:

Pierre Lacombe and a team of helpers at St. Cyrille du Wendover, Que., completed a 26.21 m (86 ft. 2 in.) high snowman named Thiro, on March 6, 1993.

World swallowing record:

A 42-year-old person reportedly swallowed 2 533 objects, including 947 bent pins. These were removed in June 1927 at an Ontario hospital.

—from Guinness Book of World Records

1. What percentage of the 2 533 objects swallowed by the person were bent pins? (Round your response to the nearest whole percent.)

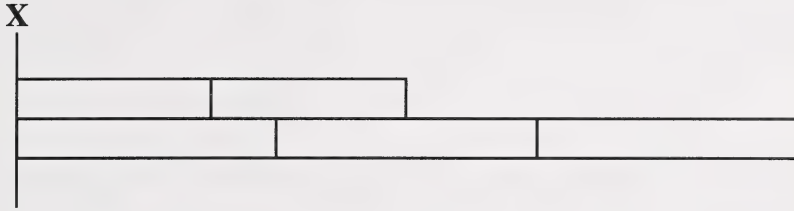
THE ANSWER TO THE NUMERICAL RESPONSE
SECTION OF THE ANSWER SHEET

2. If $(5^x)^3 = 5^{18}$, what does x equal?

THE ANSWER TO THE NUMERICAL RESPONSE
SECTION OF THE ANSWER SHEET

Use the following information to answer question 3.

Starting at line X, Brad lays down rectangular strips of wood, each 18 cm long, in one row. In an adjacent row, he lays down other wood strips, each 24 cm long, as shown in the diagram.



3. At what distance from line X will the ends of the two different strips first align?

RECORD YOUR ANSWER IN THE NUMERICAL-RESPONSE SECTION OF THE ANSWER SHEET

4. In the following formula, h represents the number of hours a person should study to pass the test to obtain a learner's licence and p represents the number of pages in the manual.

$$5(h + 5) = p$$

How many hours should Jillian study if the manual has 60 pages?

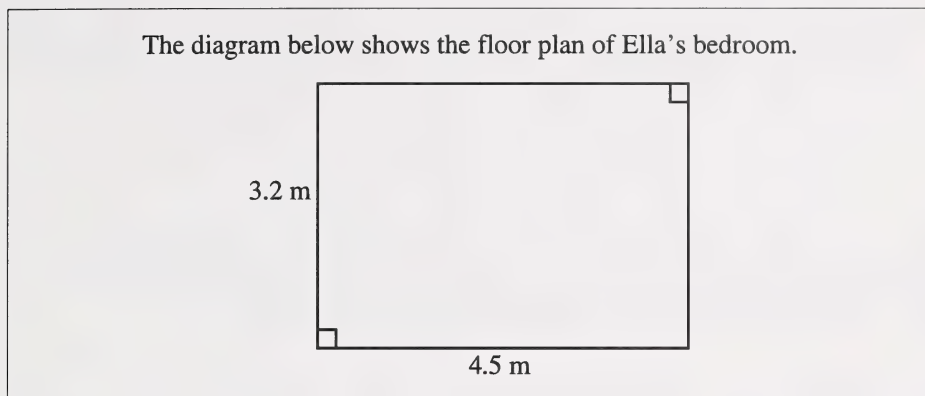
RECORD YOUR ANSWER IN THE NUMERICAL-RESPONSE SECTION OF THE ANSWER SHEET

5. A factory inspector chooses 20 radios at random from an assembly line. She tests all 20 and finds that 2 of them are defective. On the basis of this sample, how many defective radios would be expected in a batch of 1 050?

RECORD YOUR ANSWER IN THE NUMERICAL-RESPONSE
SECTION OF THE ANSWER SHEET

HOME IMPROVEMENTS

Use the following information to answer question 1.



1. How much would it cost to carpet Ella's room if the cost of carpet is $\$45.00/\text{m}^2$?
 - A. $\$346.50$
 - B. $\$594.00$
 - C. $\$648.00$
 - D. $\$693.00$

2. If Raja wants a cellular phone, he must pay 50¢/min for each call plus a monthly fee of \$25.00. Which formula would give the phone cost for one month if c is cost in dollars and x is the number of minutes that he spends on the phone?
 - A. $c = 50(x + 0.25)$
 - B. $c = 25x + 0.50$
 - C. $c = 0.50(x + 25)$
 - D. $c = 0.50x + 25$

3. Mary wants to construct a circular poster to hang in a space measuring 1.5 m by 1.8 m. What is the radius, in metres, of the largest possible circle that she could construct?
- A. 0.75 m
B. 0.90 m
C. 1.5 m
D. 1.8 m
4. Mary hires a painter to paint the walls of her room. The painter tells her that it will cost \$121.00. If he uses the formula $c = 3x + 25$, where c = cost in dollars and x = area in square metres to be painted, what is the area of walls to be painted?
- A. 15.3 m²
B. 32.0 m²
C. 48.7 m²
D. 380.0 m²

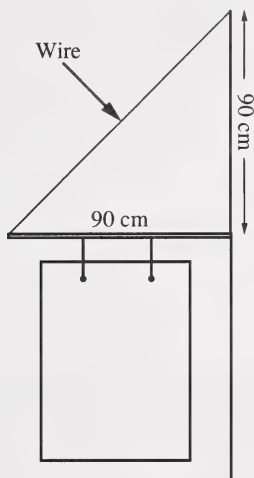
THE PIZZA PLACE

5. Julie has dimes in one hand and quarters in the other hand. She has the same amount of money in each hand. If Julie has 12 fewer quarters than dimes, how much money does she have in each hand?
- A. \$20.00
B. \$18.00
C. \$4.00
D. \$2.00
6. The Pizza Place's goal for weekly pizza sales was \$4 096. Mary said that this amount is the same as $(4^3)^x$, where x equals
- A. 2
B. 3
C. 4
D. 5

SCHOOL ACTIVITIES

Use the following information to answer question 7.

Jim decided to hang his advertising poster for the school play as shown below.



7. To the nearest centimetre, how long is the wire?

- A. 127 cm
- B. 180 cm
- C. 8 100 cm
- D. 16 200 cm

Use the following information to answer question 8.

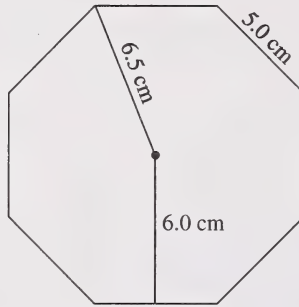
The student council members of Rydale High are finalizing their plans for the school dance. The D.J. they hired to play for the evening charges a base fee of \$300 and a surcharge of \$1.50 per student that attends the dance.

8. If the student council members want to make a profit of \$900 and are expecting 300 students to attend, how much would they need to charge each person?

- A. \$3.00
- B. \$5.50
- C. \$4.00
- D. \$5.33

Use the following information to answer question 9.

Jim made a decorative program for the play as shown below.



9. What is the area of the program?

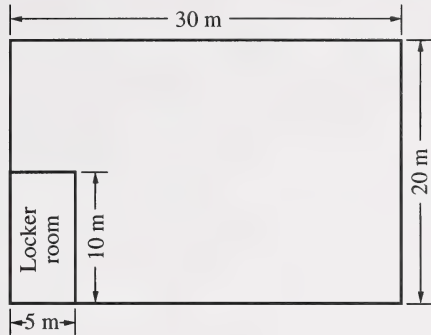
- A. $1\,560\text{ cm}^2$
 - B. 780 cm^2
 - C. 130 cm^2
 - D. 120 cm^2
-

10. The ratio of boys to girls watching a rehearsal for the play was 3:5. If there were 36 boys, how many girls were there?

- A. 22
- B. 58
- C. 60
- D. 96

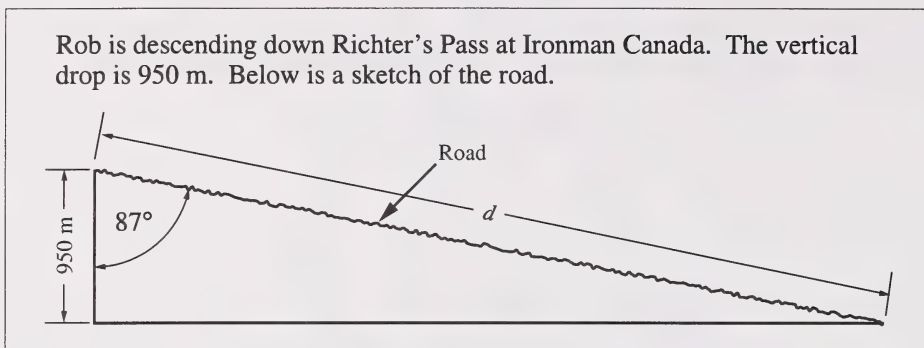
Use the following information to answer question 11.

Coach Johnson and Coach Lane put a proposal together for the construction of a new gym. The proposed floor plan for the new school gym is shown below.



11. If the plan is revised and the dimensions of the locker room are reduced by 20%, how much smaller will the area of the new locker room be than originally planned?
- A. 36%
B. 20%
C. 40%
D. 64%
-
12. A baseball pitcher's batting average is 0.180. What is 0.180 expressed as a fraction in lowest terms?
- A. $\frac{9}{5}$
B. $\frac{2}{11}$
C. $\frac{9}{50}$
D. $\frac{9}{500}$

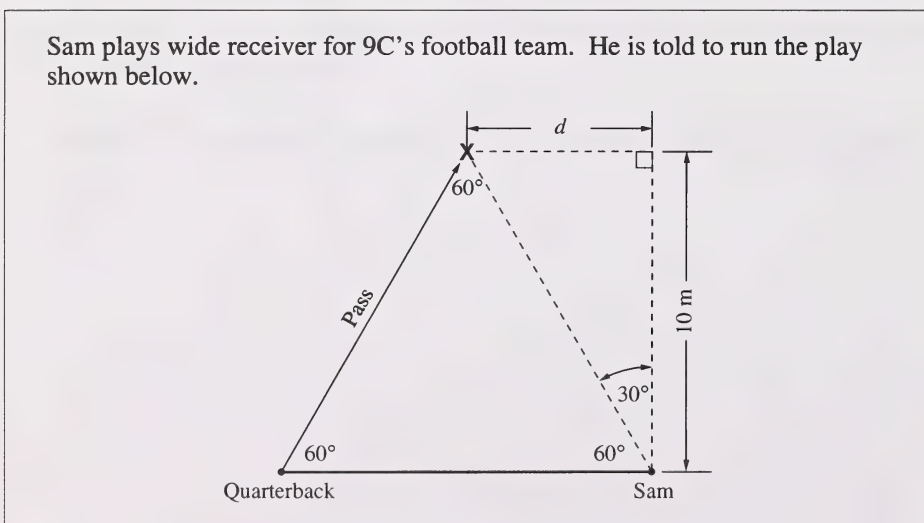
Use the following information to answer question 13.



13. What is the distance (d) of the road?

- A. 18 152 m
- B. 18.15 m
- C. 951 000 m
- D. 18 128 m

Use the following information to answer question 14.



14. What is the lateral (sideways) distance (d) he must run to catch the ball?

- A. 5.0 m
- B. 5.8 m
- C. 8.7 m
- D. 17.3 m

CONNECTIONS WITHIN MATHEMATICS

Use the following information to answer question 15.

There are three radio stations in a town with about 60 000 potential listeners. Peter was hired to determine the approximate number of listeners each station had. He decided to survey 200 people.

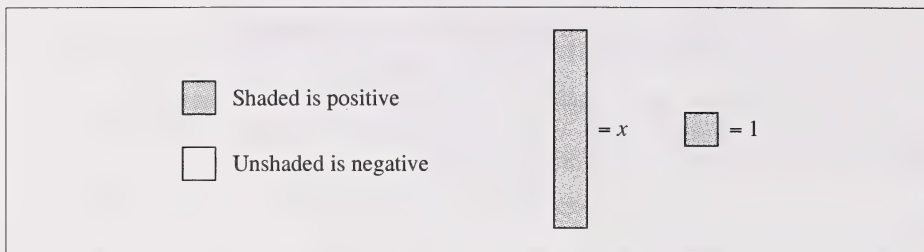
15. These 200 people are called a
- A. sample
 - B. population
 - C. frequency
 - D. census
-
16. Jane, a member of the peer support team, did a survey of her classmates after a math test. She found the mean score was 68%. Six of the scores were 48%, 63%, 89%, 53%, 92%, and 47%. What was the seventh score?
- A. 16%
 - B. 68%
 - C. 78%
 - D. 84%

Use the information below to answer question 17.

The cost of one share of a corporation listed on a market exchange was \$35.00 one week. The next week, it had gone up 10%. The week after, it dropped 10%.

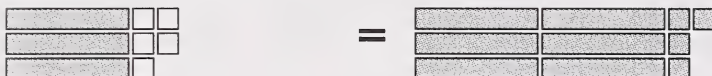
17. What was the latest price for one share?
- A. \$34.65
 - B. \$35.00
 - C. \$38.50
 - D. \$42.00

Use the following legend when answering question 18.

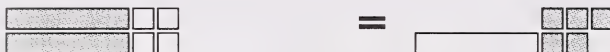


18. Which of the following has a solution of $x = 3$?

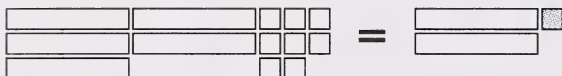
A.



B.



C.



D.



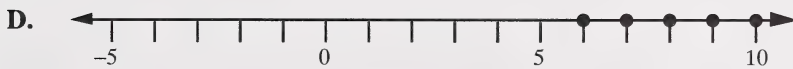
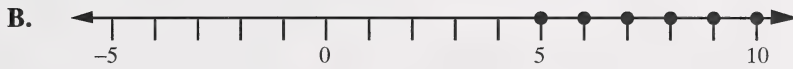
19. The first degree term in $5x^2 + 2xy + 3y - 4$ is

- A. $5x^2$
- B. $2xy$
- C. $3y$
- D. -4

20. What is the solution for $x - 4.6 \geq -26.5$?

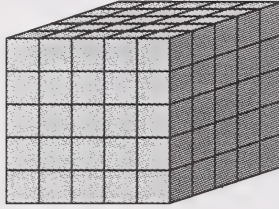
- A. $x \geq -21.9$
- B. $x \leq -21.9$
- C. $x \geq -31.1$
- D. $x \leq -31.1$

21. Which of the following is a graph of the solution set of $3x \geq 15$, where x is an integer?



Use the following information to answer question 22.

A wooden cube that measures 10 cm along each edge is painted red. The painted cube is then cut into cubes measuring $2 \times 2 \times 2$ cm.



22. How many of the 2 cm cubes do **not** have red paint on any face?
- A. 125
B. 98
C. 36
D. 27
-
23. What is the probability of rolling 2 6-sided dice and obtaining a sum of seven?
- A. $\frac{1}{6}$
B. $\frac{1}{36}$
C. $\frac{7}{36}$
D. $\frac{7}{12}$
24. At an airshow, Canada's squadron, the Snowbirds, perform a stunt that involves climbing to an altitude of 3 000 m while covering only 2 km of ground distance. During this climb, what distance to the nearest metre does the plane actually travel?
- A. 3 606 m
B. 5 000 m
C. 71 m
D. 55 m

Key and Descriptors for Practice Questions

Numerical-Response Questions

Ques. No.	Key	Program Strand*	Reporting Category**	Curriculum Standard
NR1	37	N	K	Write a ratio as a percentage
NR2	6	N	K	Use laws of exponents
NR3	72	N	S	Apply concept of lowest common multiple
NR4	7	PR	K	Solve a linear equation
NR5	105	SP	S	Predict a population size based on a random sample

Multiple-Choice Questions

Ques. No.	Key	Program Strand*	Reporting Category**	Curriculum Standard
1	C	SS	K	Calculate the area of a rectangle and multiply by unit cost
2	D	PR	S	Model a situation algebraically
3	A	SS	S	Apply concepts of circles and space to solve a problem
4	B	PR	S	Evaluate an equation using subtraction and division
5	D	PR	S	Select a strategy to solve a complex logic problem
6	A	N	S	Apply the exponent laws for powers with integral exponents
7	A	SS	S	Apply pythagorean relationship in a practical situation
8	B	PR	S	Solve a problem that can be represented with a first-degree, single-variable equation
9	D	SS	S	Determine a strategy to find the area of a regular polygon
10	C	N	S	Find the missing element of a proportion
11	A	SS	S	Describe effects of dimension changes involving area of 2-D shape
12	C	N	K	Convert a decimal expression into a fraction
13	A	SS	K	Calculate the length of a side of a right angle triangle
14	B	SS	S	Apply trigonometric ratio to solve a problem involving a right angle triangle

* N—Number; PR—Patterns and Relations; SS—Shape and Space; SP—Statistics and Probability

** K—Knowledge; S—Skills

15	A	SP	K	Know the meaning of “sample”
16	D	SP	S	Apply understanding of mean to answer the question
17	A	N	S	Apply percentage increase and decrease
18	B	PR	S	Solve an equation represented pictorially
19	C	N	K	Identify a first-degree term
20	A	PR	K	Solve a simple inequality
21	B	PR	S	Represent the solution set for an inequality on a graph
22	D	SS	S	Solve a design problem in three dimensions
23	A	SP	K	Calculate probability
24	A	N	K	Solve a problem where the answer involves the square root of a number

* N—Number; PR—Patterns and Relations; SS—Shape and Space; SP—Statistics and Probability

** K—Knowledge; S—Skills

Preparing Students for the Test

The best way to prepare students for the achievement tests is to teach the curriculum well and to ensure that children know what is expected. Many of the skills and attitudes that support test writing are in fact good skills and strategies for approaching all kinds of learning tasks.

Have students do the practice questions included in this bulletin. Then, have students share strategies they used to answer the questions.

Teachers are also encouraged to share the following information with their students to help them prepare for the Grade 9 Mathematics Achievement Test.

Tips on Taking Multiple-Choice Tests

- Before you begin, find out:
 - How much time do you have?
 - Can you use a calculator, tables, diagrams, manipulatives, etc.?
- Ask questions if you are unsure of anything.
- Skim through the whole test before beginning. Find out how many questions there are and plan your time accordingly.
- Answer the easier questions first and then go back to the harder ones.
- Do not spend too much time on any one question. Make a note (*or ?) beside the question and go back to it if you have time.
- Read each question carefully, underline key words, and try to think of an answer before looking at the choices.
- Read all the choices and see which best fits the answer.
- When you are not sure which answer is correct, cross out any choices that are wrong, and then pick the choice that is best.
- Guess if you don't know the right answer. Answer all questions—there is no penalty for guessing.
- If time permits, recheck your answers.
- Double check to make sure you have answered everything before handing in the test.
- Notice that the questions on the mathematics test are organized in narrative themes.
- Read the information given using the strategy that works best for you. You should either
 - look at all the information and think carefully about it before you try to answer the questions **OR**
 - read the questions first and then look at the information, remembering the questions you need to answer.
- Make sure you look at all forms of the information given. Information may be given in words, charts, pictures, graphs, and maps.
- When you are given information for more than one question, remember to go back to the information before answering each question.
- Check your work when you calculate an answer, even when your answer is one of the choices.

For further suggestions, see *Teaching Students with Learning Disabilities*, Alberta Education, Special Education Branch, pages LD 122 to 124.

Interim Policy: Use of Calculators on Alberta Education Achievement Tests

September 1997

Rationale

Recent changes in the program of study for mathematics require students to become familiar with the use of a calculator in order to complete complex computations or verify solutions to problems. The increased availability of technology in schools helps students to solve complex, real-life multistep problems.

Questions on future Grade 9 Mathematics Achievement tests will include real-life problems involving more than a single step. Students will need to use a scientific calculator when writing the Grade 9 Mathematics Achievement Test; trigonometric tables are **not** provided. Tests are constructed to ensure that the use of particular models of calculators neither advantages nor disadvantages individual students.

Definition

This policy considers a scientific calculator to be a handheld device designed for complex mathematical computations. Included in this definition are those calculators having the capabilities of performing calculations involving square root, sine, cosine, and tangent. Calculators that have more sophisticated features such as graphing capabilities, built-in formulas, mathematical functions, or other programmable capabilities are included in this definition, but are not required in Grade 9 Mathematics.

Policy

Grade 9: To ensure equity and fairness for all students and compatibility with the provincial *Program of Studies*, Alberta Education **expects** students to use scientific calculators, as defined above, when writing the Grade 9 Mathematics Achievement Test.

Grade 6: Those Grade 6 students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the Grade 6 Mathematics Achievement Test.

Grade 3: From their early years in school, students are expected to become increasingly familiar with calculators and confident in using them to solve problems. Nevertheless, students need to have mastered basic addition facts (to 18), subtraction facts (to 18), and multiplication facts (to 49). To respect this principle as well as the problem-solving nature of the new curriculum, there will be two components to the Grade 3 Mathematics Achievement Test. Those students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the multiple-choice component of the Grade 3 Mathematics Achievement Test; however, they **shall not** use calculators when writing the Timed Number Facts component of the test.

1. Teachers must, at the beginning of the Grade 9 year, advise students that a scientific calculator is **required** when writing achievement tests in mathematics.
2. Grade 9 students should be thoroughly familiar with the calculator that they will use when writing the Grade 9 Achievement Test.
3. Although a scientific calculator is not specifically required in Grade 9 science, it may be used by students when writing the Grade 9 Science Achievement Test.
4. Teachers must also advise students of the types of information that can be stored in calculators that are brought into achievement tests.
5. Calculators that have built-in notes (definitions or explanations in alpha notation) that cannot be cleared are not permitted.
6. Students must not bring to the test external devices that support calculators. Such devices include manuals, printed or electronic cards, printers, memory expansion chips or cards, external keyboards, or any annotations outlining operational procedures for scientific calculators.
7. The type of calculator that Grade 6 students use when writing achievement tests should be consistent with their skills and abilities. A scientific calculator is neither required nor recommended for Grade 6 students.
8. In preparation for calculator failure, students may bring extra calculators and batteries into the test room. The school may also provide extra calculators and batteries.
9. During achievement tests, supervising teachers must ensure that
 - all calculators operate in silent mode
 - students do not share calculators or the information contained within them
 - calculator cases are stored on the floor throughout the test
 - all test rules are followed
10. If you have any questions or comments about this interim policy, contact Kay Melville, Mathematics Assessment Specialist, Achievement Testing Unit, Student Evaluation Branch. Phone 403-427-0010 or toll-free 310-0000, or FAX 403-422-3206.

Alberta Education Contacts

Questions or comments regarding this bulletin should be directed to:

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